

REMARKS

In the Specification

The Abstract has been amended to correct typographical errors and to reduce word count. Paragraph [0035] of the specification has been amended to properly identify the figure described therein. No new matter has been added.

In the Claims

Claims 1-41 are pending in the application. Claims 1, 2, 4-9, 11, 14, 21, 23, 25-26, 28, 30, 33, 37 and 41 have been amended herein, and claims 3 and 34-36 have been canceled. Therefore, upon entry of the present amendment, claims 1-2, 4-33, and 37-41 will be subject to examination.

A. The Allowable Claims

Claims 28-30 have been held to be allowable if rewritten in independent form to include all the limitations of the base claim and of any intervening claims.

Claim 28 has been amended to read in independent format and to include all the limitations of the claims, from which claim 28 depended previously. Claim 30 has been amended to correct a typographical error.

Accordingly, claims 28-30 are believed to be allowable as amended herein.

B. The Rejection of Claims 34-36 as Anticipated by USPN 2,880,961 to Wynn

Claims 34-36 have been canceled herein. Therefore, this rejection is now moot.

C. The Rejection of Claims 1, 2, 10-11, 15, 18-19, 21-22, 26-27 and 31-35 as Obvious over USPN 3,349,795 to Matsutani (“Matsutani”) in View of USPN 4,214,604 to Rumsey (“Rumsey”)

The rejection of claims 1, 2, 10-11, 15, 18-19, 21-22, 26-27 and 31-35 over *Matsutani* in view of *Rumsey* is believed to be now moot, because Applicant has included the limitations of

claim 3 into amended claim 1, and because claim 3 has not been rejected over *Matsutani* in view of *Rumsey*.

Applicant states for the record that the amendments to claim 1 have been introduced to expedite allowance of the application and without restrictive intent. Moreover, the rejection of claims 1, 2, 10-11, 15, 18-19, 21-22, 26-27 and 31-35 over *Matsutani* in view of *Rumsey* is respectfully traversed because such rejection is believed to be contrary to law.

It is well settled that a *prima facie* case of obviousness requires: (i) a reason to combine; (ii) a reasonable expectation of success; and (iii) a teaching or suggestion of all claim limitations in the prior art. *In re Regal*, 526 F.2d 1399, 1403 n. 6, 188 USPQ2d 136 (CCPA 1975); *Brown v. Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1125 (Fed. Cir. 2000); *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003).

It is also well settled that, if the proposed modification or combination of the prior art changes the principle of operation of the prior art invention, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

It is further well settled that in evaluating obviousness, all the subject matter defined in the claim under consideration must be considered, not part or most of it. *Door-Master Corp. v. Yorktowne, Inc.*, 256 F.3d 1308 Fed. Cir. 2001). A prior art may be considered to “teach away” when “a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the references, or would be led in a direction divergent from the path that was taken by the applicant. *In re Gurley*, F.3d 551 (Fed. Cir. 1994).

The rejection of claims 1, 2, 10-11, 15, 18-19, 21-22, 26-27 and 31-35 over *Matsutani* in view of *Rumsey* is believed contrary to law because the combination of *Matsutani* and *Rumsey*:

1. Does not teach all the limitations of the rejected claims;
2. Changes the principles of operations of the cited prior art; and
3. Teaches away from the limitations of claim 1 and from the claims depending therefrom.

The Examiner has characterized *Matsutani* as disclosing a diaphragm valve substantially as claimed by Applicant but not disclosing an elliptical shape for the valve dome.” Applicant submits that the Examiner has misapprehended *Matsutani*’s invention.

Matsutani discloses a diaphragm valve having circular entry ports, in which the inlet and outlet sleeves assume a semicircular shape that arches upwards towards a weir, combining at the valve seat to form a circular shape divided by the weir. *Matsutani*, Figs. 1, 9b, and 10.

Matsutani also teaches that “[t]he diaphragm 12 is made of polytetrafluoroethylene resins which have little flexibility, and accordingly such a resin is made into a thin membrane and provided with a lining 13 made of elastic materials, such as rubber, to receive compressive force of the compressor 14.” *Matsutani*, col. 2, lines 65-69. Additionally, “[i]n the embodiment of the invention described in the foregoing, a rubber lining 13 was provided on the diaphragm 12, however, it will be apparent to those skilled in the art that the invention can also be applied to a diaphragm valve without lining.” *Matsutani*, col. 5, lines 49-53.

With regard to Applicant’s claim 1, not only does *Matsutani* not teach a “valve seat having an arched profile of substantially elliptical curvature and a flattened central surface,” but *Matsutani* also does not teach “a diaphragm (5) made of an elastomeric material” because *Matsutani* teaches the use of a semi-spherical diaphragm made with a material having little flexibility, while an elastomeric material is known to be a flexible material.

Concerning the *Rumsey* reference, the Examiner has characterized *Rumsey* as disclosing “another diaphragm valve having an elliptical shape for the diaphragm and a rectangular shape for the sealing flange.” Applicant submits that the Examiner has misapprehended *Rumsey*’s invention.

Rumsey instead teaches a straight through flow diaphragm valve having circular inlet and outlet ports that each expand to achieve an intermediate semi-oval shape and that eventually converge into a valve seat having a trapezoidal shape. *Rumsey*, Abstract; Figs. 1, 2, and 4. *Rumsey* expressly states that his invention has a straight-through flow designed to eliminate the use of weirs in diaphragm valves. *Rumsey*, col. 1, lines 1-29.

Rumsey teaches a wedge-shaped diaphragm, or that “the diaphragm 20 comprises a rib-like elastomeric body 45 of generally triangular cross-section providing an apex projecting from the front face of the diaphragm, that is the face which is at the inner side of the diaphragm as mounted in the valve assembly.” *Rumsey*, col. 6, lines 39-44; Fig. 4, cut along line IV-IV, see col. 3, lines 24-25; Fig. 2. Not only do the specifications of *Rumsey* and Applicant describe diaphragms that are structurally different, but the combination of *Matsutani* and *Rumsey* does not teach all the elements of claim 1 as currently amended. For example, the cited references do not teach “the dome [of the diaphragm] comprising a plurality of ribs disposed essentially parallel to a shorter axis of the dome,” because the cited references do not address the issue of bulging diaphragms. As a further example, *Rumsey* does not teach a diaphragm having the shape of a section of an ellipsoid, as shown above.

In addition, the combination of *Matsutani* and *Rumsey* is inoperative, because *Matsutani* has been cited as disclosing Applicant’s invention except for the elliptical diaphragm. However, *Matsutani* is based on a rigid rather than the elastomeric diaphragm disclosed by Applicant, so the principle of operation of *Matsutani* would have to be changed to achieve Applicant’s invention. A rigid material would not properly operate as a diaphragm having an elliptical curvature, and, furthermore, *Rumsey* teaches a wedge-shaped diaphragm.

Instead, by requiring relatively rigid diaphragms, *Matsutani* teaches away from Applicant’s invention as claimed in claim 1. By requiring that no weirs be present and by requiring wedge-shaped diaphragms, *Rumsey* also teaches away from Applicant’s invention as claimed in claim 1.

For at least these reasons, claim 1 is patentable over the combination of *Matsutani* and *Rumsey*. The claims depending from claims 1 are patentable at least for the same reasons as claim 1 and for the additional limitations they contain.

With respect to claims 12 and 13, the combination of *Matsutani*, *Rumsey*, and USPN 4,538,638 to *Stack* still does not teach Applicant’s invention. *Matsutani* and *Rumsey* have been discussed above. *Stack* discloses a plastic lined diaphragm valve, in which the liner is stabilized against movement by extending the liner into recesses in the valve body. *Stack*, Title; Abstract.

Stack differs from Applicant's invention in several aspects, and still does not disclose, for example, a diaphragm having the structure claimed by Applicant.

With further respect to the combination of *Matsutani* with *Rumsey*, Applicant notes that the Examiner has not addressed the additional limitations of certain of Applicant's claims, see e.g. claims 10, 15, 20, which are believed to be novel and non-obvious based on the specific limitations contained therein, in addition to being patentable for the reasons described hereinbefore.

Amendment have been introduced to some of the claims to correct typographical errors; remove redundant language (for example, the "means" element in claim 1); and improve terminology (for example, by replacing "teeth" with "projections" in claim 11, which the Examiner has held to be equivalent terms at paragraph 6 of the Office Action).

D. The Rejection of Claims 1-12, 15, 18-21, 23-27 and 31-41 as Obvious over USPN 6,095,484 to Frenkel ("Frenkel") in view of Rumsey

The rejection of claims 1-12, 15, 18-21, 23-27 and 31-41 as allegedly obvious over *Frenkel* in view of *Rumsey* is respectfully traversed because such rejection is believed to be contrary to the law. The relevant law is summarized in the preceding section.

Frenkel discloses a spring diaphragm for shut-off valves and regulators. More particularly, *Frenkel* discloses that:

- The diaphragm consists of two storeys (parts) connected to one another. Col. 2, l. 50-52.
- The lower part of the diaphragm (the lower storey), in contact with the valve seat, is a scarcely deformable, thin, stiff sheet. Col. 3. l. 25-26.
- Ribs are disposed radially on the concave surface of the lower part of the diaphragm. Col. 3, l. 37-41. Those radial ribs include annular ridges. Col. 3, l. 45-47; FIG. 2.
- When pressure is applied above the diaphragm, the diaphragm of *Frenkel* tends to deform to a position in which part of the diaphragm area on the outlet side is lower than part of the area on the inlet side. Col. 5, l. 1-3. Therefore, *Frenkel*'s

diaphragm bulges. This problem arises because the ribs in *Frenkel* are arranged to meet a different design requirement, that is, to have the diaphragm operate without the use of a spring element, rather than to avoid a bulging of the diaphragm.

On the contrary, the diaphragm in Applicant's invention is operable as a single storey; is manufactured from an elastomeric material; has ribs disposed essentially linearly and parallel to the shorter axis of the ellipsoid; does not require annular ridges to connect the ribs; and is structured to avoid bulging.

Not only does a cursory reading of the specification and drawings illustrate the differences between *Frenkel* and Applicant's invention, but *Frenkel* does not teach or suggest the limitations of claim 1 that the diaphragm has a part "made of an elastomeric material" in contact with the valve seat, and with "the dome comprising a plurality of ribs disposed in symmetrical position essentially parallel to a shorter axis of the dome."

Based on the disclosure of *Frenkel*, in particular, *Frenkel*'s own admission that its valve structure is prone to bulging (Col. 4, l. 66 – col. 5, l. 3), Applicant respectfully disagrees with the Examiner's assertion that *Frenkel*'s "ribs inherently serve to prevent bulging." *Frenkel* addresses the problem of bulging by providing for the option of having the diaphragm include bearing areas 14, which are disposed in the direction of flow and which are positioned on the lower half of the diaphragm, facing the valve seat (see, e.g., col. 5, l. 4-7; FIGS. 4-5). As it can be seen, even bearing areas 14 are disposed on a side of the diaphragm and in a direction that contrasts with Applicant's claimed invention.

Rumsey has been discussed in detail in the previous section, and such discussion is equally applicable here but will not be repeated for the sake of brevity. Briefly, such discussion highlights various reasons why the structure of *Rumsey*, with its straight-through flow path, its teaching that no weir should be used, and its wedge-shaped diaphragm, cannot be held to anticipate elements of Applicant's invention as argued by the Examiner. For the foregoing reasons, it is believed that a rejection of claim 1 and of the claims depending therefrom in view of the combination of *Frenkel* and *Rumsey* is contrary to law for the reasons cited in the present and preceding sections, because the combination of *Frenkel* and *Rumsey* does not teach all the

limitations of the rejected claims; changes the principles of operations of the cited prior art; and teaches away from the limitations of claim 1.

For at least these reasons, claims 1 and 37, as currently amended, are patentable over the combination of *Frenkel* and *Rumsey*. The claims depending therefrom are patentable for the same reasons and for the additional elements they contain.

Moreover, claims 13-14, 16 and 17 are patentable over the combination of *Frenkel*, *Rumsey* and *Gotch*. *Frenkel* and *Rumsey* have been discussed above. *Gotch* teaches a diaphragm valve, in which the diaphragm is clamped between two portions of the valve body. *Gotch*, Abstract. While *Gotch* differs from Applicant's invention in other aspects, *Gotch* still does not add the structural missing from *Frenkel* and *Rumsey*, for example, the structure of the diaphragm in Applicant's invention.

Conclusion

For the foregoing reasons, it is submitted that the proposed amendments comply with 37 C.F.R. § 1.116 and should therefore be entered, and that with their entry the application is now in condition for allowance. Such action is therefore respectfully requested.

If it is felt that direct communication would serve to advance prosecution of the present application, the Examiner is invited to contact the undersigned attorney of record, Franco A. Serafini, by telephone, fax, or e-mail.

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